What is claimed is:

1. A method of detecting an analyte comprising the steps of:

   (a) anchoring said analyte to a nucleic acid template;

   (b) conducting a nucleic acid polymerase reaction to produce labeled polyphosphate, said reaction comprising the reaction of said template, a primer, at least one terminal phosphate-labeled nucleotide, and a nucleic acid polymerase; and

   (c) analyzing said labeled polyphosphate.

2. The method of claim 1, wherein said primer is a nuclease resistant primer.

3. The method of claim 2, wherein the nucleic acid polymerase reaction further includes an enzyme having 3' → 5' exonuclease activity.

4. The method of claim 1, wherein said analyzing step includes (a) reacting said labeled polyphosphate with a phosphatase to produce a detectable species characteristic of said analyte and (b) detecting said detectable species.

5. The method of claim 1, further including the step of separating any nucleic acid template not anchored by said analyte before said conducting step.

6. The method of claim 4, wherein said reacting step and said conducting step are carried out simultaneously.

7. The method of claim 1, further comprising the step of characterizing said analyte.

8. The method of claim 7, further comprising the step of quantifying said analyte.

9. The method of claim 1, wherein said analyte is DNA, RNA, protein, lipid, oligosaccharide, a whole cell, or a synthetic polymer.

10. The method of claim 1, wherein said analyte is anchored to said nucleic acid template by non-covalent binding, or by one or more covalent bonds.

11. The method of claim 1, wherein said nucleic acid polymerase is a DNA polymerase or an RNA polymerase.

12. The method of claim 2, wherein said nuclease resistant primer includes a methyl phosphonate, a borano phosphate or a phosphorothioate linkage.

13. The method of claim 1, wherein said nucleic acid template and said primer are switched and it is said primer that is anchored to the analyte.

14. The method of claim 1, wherein said nucleic acid template and said primer are part of a DNA hairpin, and said DNA hairpin is anchored to said analyte in said anchoring step.

15. The method of claim 4, wherein said detectable species is detectable by a property selected from the group consisting of color, fluorescence emission, chemiluminescence, mass change, oxidation/reduction potential and combinations thereof.

16. The method of claim 4, wherein said detectable species is produced in amounts substantially proportional to the amount of analyte.

17. The method of claim 1, wherein at least one terminal phosphate-labeled nucleotide includes four or more phosphate groups in the polyphosphate chain.

18. The method of claim 1, wherein the labels in at least one terminal phosphate-labeled nucleotide are enzyme-activatable labels selected from the group consisting of chemiluminescent compounds, fluorogenic dyes, chromogenic dyes, mass tags, electrochemical tags and combinations thereof.

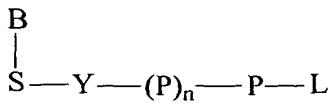
19. The method of claim 1, wherein said terminal phosphate-labeled nucleotides carry distinct labels.

20. The method of claim 19, wherein the presence of an analyte is determined by the ratio of distinct labels produced.

21. The method of claim 1, wherein one or more additional detection reagents are added in said polymerase reaction of said conducting step, and said additional detection reagents are capable of a response that is detectably different from said labeled polyphosphate.

22. The method of claim 1, wherein at least one terminal phosphate-labeled nucleotides are deoxy nucleotides and carry different labels.

23. The method of claim 1, wherein at least one terminal-phosphate-labeled nucleotide is represented by the formula:



wherein P is phosphate (PO_3) and derivatives thereof, n is 2 or greater; Y is an oxygen or sulfur atom; B is a nitrogen-containing heterocyclic base; S is an acyclic moiety, carbocyclic moiety or sugar moiety; L is an enzyme-activatable label containing a hydroxyl group, a sulfhydryl group or an amino group suitable for forming a phosphate ester, a thioester or a phosphoramidate linkage at the terminal phosphate of a natural or modified nucleotide; and P-L is a phosphorylated label which preferably becomes independently detectable when the phosphate is removed.

24. The method of claim 23, wherein said sugar moiety is selected from the group consisting of ribosyl, 2'-deoxyribosyl, 3'-deoxyribosyl, 2', 3'-dideoxyribosyl, 2', 3'-didehydrodideoxyribosyl, 2'-alkoxyribosyl, 2'-azidoribosyl, 2'-aminoribosyl, 2'-fluororibosyl, 2'-mercaptoriboxyl, 2'-alkylthioribosyl, carbocyclic, acyclic and other modified sugars.

25. The method of claim 23, wherein said base is selected from the group consisting of uracil, thymine, cytosine, guanine, 7-deazaguanine, hypoxanthine, 7-deazahypoxanthine, adenine, 7-deazaadenine, 2,6-diaminopurine and analogs thereof.

26. The method of claim 23, wherein said enzyme-activatable label is selected from the group consisting of chemiluminescent compounds, fluorogenic dyes, chromogenic dyes, mass tags, electrochemical tags and combinations thereof.

27. The method of claim 26, wherein said enzyme-activatable label is a fluorogenic moiety selected from the group consisting of 2-(5'-chloro-2'-phosphoryloxyphenyl)-6-chloro-4-(3H)-quinazolinone, fluorescein

diphosphate, fluorescein 3'(6')-*O*-alkyl-6'(3')-phosphate, 9H-(1,3-dichloro-9,9-dimethylacridin-2-one-7-yl)phosphate, 4-methylumbelliferyl phosphate, resorufin phosphate, 4-trifluoromethylumbelliferyl phosphate, umbelliferyl phosphate, 3-cyanoumbelliferyl phosphate, 9,9-dimethylacirdin-2-one-7-yl phosphate, 6,8-difluoro-4-methylumbelliferyl phosphate, and derivatives thereof.

28. The method of claim 26, wherein said phosphorylated label is a chromogenic moiety selected from the group consisting of 5-bromo-4-chloro-3-indolyl phosphate, 3-indoxyl phosphate, *p*-nitrophenyl phosphate, and derivatives thereof.

29. The method of claim 26 , wherein said chemiluminescent compound is an alkaline phosphatase-activated 1,2-dioxetane compound.

30. The method of claim 29, wherein said 1,2-dioxetane compound is selected from the group consisting of 2-chloro-5-(4-methoxyspiro[1,2-dioxetane-3,2'-(5-chloro-)tricyclo[3,3,1-$1^{3,7}$]-decan]-1-yl)-1-phenyl phosphate, chloroadamant-2'-ylidenemethoxyphenoxy phosphorylated dioxetane, 3-(2'-spiroadamantane)-4-methoxy-4-(3''-phosphoryloxy)phenyl-1,2-dioxetane and derivatives thereof.

31. A kit for detecting an analyte comprising:

(a) at least one terminal-phosphate-labeled nucleotide;

(b) a DNA polymerase; and

(c) a phosphatase.

32. A kit for detecting an analyte according to claim 31, further comprising: a nuclease with enzymatic activity sufficient to decompose DNA in the 3' → 5' direction.

33. A kit for detecting an analyte according to claim 31, wherein said DNA polymerase has nuclease activity sufficient to decompose DNA in the 3' → 5' direction.

34. A kit for detecting an analyte according to claim 31, further comprising:

(a) at least one nucleic acid template; and

(b) at least one nuclease resistant primer complementary to said at least one nucleic acid template;

wherein said at least one nucleic acid template and/or said complementary nuclease resistant primer has an anchoring moiety.

35. A kit for detecting an analyte according to claim 31, further comprising at least one hairpin template-primer combination with a nuclease resistant 3'-end.

36. A method of detecting and characterizing multiple analytes in a sample, comprising the steps of:

(a) anchoring to each analyte a specific template nucleic acid sequence with a unique base at the site opposite to the complementary nucleotide being added;

(b) conducting a DNA polymerase reaction to produce labeled polyphosphates, said reaction comprising the reaction of said templates, primers complementary to said specific template sequence, two or more terminal phosphate-labeled nucleotides with different labels, a DNA polymerase and an enzyme having 3' → 5' exonuclease activity;

(c) permitting said labeled polyphosphates to react with a phosphatase to produce detectable species unique to each of said analytes; and

(d) detecting said detectable species.

37. A method of detecting and characterizing multiple analytes in a sample, comprising the steps of:

(a) anchoring to each analyte a specific template nucleic acid sequence with a unique base at the site opposite to the complementary nucleotide being added;

(b) conducting a DNA polymerase reaction to produce uniquely labeled polyphosphates; said reaction comprising the reaction of said templates, nuclease resistant primers complementary to said specific target sequence of each of said multiple analytes, two or more terminal phosphate-labeled nucleotides having 4 or more phosphate groups in the polyphosphate chain and each bearing a different label, a DNA polymerase and an enzyme having 3' → 5' exonuclease activity; and

(c) detecting the labeled polyphosphates.

38. A method of detecting and characterizing multiple analytes in a reaction compartment, comprising the steps of:

(a) anchoring a unique template nucleic acid sequence to each of said analytes;

(b) anchoring said analytes to the surface of said reaction compartment;

(c) conducting a DNA polymerase reaction to produce labeled polyphosphate; said reaction comprising the reaction of the unique template sequence of one of said analytes, a nuclease resistant primer complementary to said unique template sequence, at least one terminal phosphate-labeled nucleotides having 4 or more phosphate groups in the polyphosphate chain, a DNA polymerase and an enzyme having 3' → 5' exonuclease activity;

(d) detecting said labeled polyphosphate;

(e) washing off the unanchored components; and

(f) repeating steps (a) to (d) with a nuclease resistant primer complementary to another unique template sequence of a different analyte until all the analytes are analyzed.

39. The method of claim 38, wherein said at least one terminal phosphate labeled nucleotides have 4 or more phosphate groups in the polyphosphate chain.

40. The method of claim 38, wherein said detecting step includes:

(a) permitting said labeled polyphosphate to react with a phosphatase to produce a detectable species; and

(b) detecting said detectable species.